

# Vehicles & Edge Protection

***Transport accounts for a high percentage of accidents in quarries. It has been a priority for ASPASA for many years but until the industry addresses safe vehicle, safe workplace, competent driver and supervision it will not improve. None of the things set out below are complicated and there are some basic things that can be done straight away which will have a significant improvement in the figures. Look closely at you workplace, could this happen to you.***

Road vehicles – Your haul roads start at the entrance to the quarry. Can a visitor find their way into the quarry and to a point such as car park or weigh bridge if they are in a lorry Is there sufficient signage. Cars should not be allowed past the car park. Is reversing minimised. Many loading points are too low for the vehicles that are loaded there. This is not acceptable and arrangement must be made to ensure that vehicles can be loaded without reversing.

Have you considered whether the road vehicles and site vehicles need to mix. Can the road vehicles be held in a holding bay until they are needed at the loading point. Can they be separated from the site vehicles. What special precautions will be taken where they have to cross.

Are the road surfaces suitable for road going vehicles. Tipping points for road vehicles should be level. These vehicles particularly articulated vehicles are prone to overturn if there is a cross grade, if the tractor unit is not straight with the cab (on articulated vehicles) or where sticky loads are being transported.

Although site vehicles are big and tough, they frequently overturn or are in a collision with one another because they are being used in the wrong conditions. It is essential that basic rules are observed. You should check your site rules to ensure that they can be used safely. Always wear your safety belt; it would save 25% of all fatal accidents at quarries.

Road widths – Roads need to be wide enough to allow vehicles to pass with ease, or if they are narrow one way working or traffic controls will be needed such as traffic lights. For single track roads they should be a minimum of two times the width of the largest vehicle. For two way roads they should be three and one half times the width of the largest vehicle using the road. The dimensions above are the minimum acceptable widths.

Road gradients are often misunderstood. For rigid vehicles they should not exceed 1:10. This is not the same as 10 degrees. The following diagrams illustrate this. Brake testing results are measured in % g and can be readily adapted to the use of % gradient above. For example a vehicle with 20% g brake efficiency would not stop on a slope of 1:5. Thus having designed your roads you have to choose a

vehicle that is suitable to work within your design parameters or change your design. 10 degree slope is equivalent to 17% which is a lot steeper than a 10% slope and would be too steep for older dump trucks to stop on!

The failure to provide adequate edge protection is the cause of many of the vehicle incidents in quarries. The recommended height is 1.5m or half the height of the largest wheel using the road or tip, whichever is the greater. As a rule of thumb if you can see over it is probably not high enough. The recommendation is the minimum that is required and acts as an edge marker to warn the driver of the vehicle. To stop the vehicle going over the edge higher berms are required. These should be installed in areas where it is likely that a vehicle may go through the edge protection.

Edge protection should be built on a good foundation. Sand pushed off the edge of the road will be too soft to work and give a false sense of security.

Many of the tipping accidents occur when the rear wheel of the vehicle on the opposite side to the driver goes over the edge and the vehicle falls off the tip. To prevent this happening the following should always be followed:-

(1) Never reverse towards the tip edge unless adequate edge protection is provided. A minimum height of edge protection of 1.5m or half the wheel diameter whichever is the larger must be provided.

(2) Some vehicles have their cabs on the left and some on the right; others are in the middle of the machine. Therefore always reverse at right angles to the edge protection

(3) Never reverse with the wheel diagonally opposite to the driver approaching the edge protection first. Too many drivers have been killed doing this.

(4) The edge protection must be provided on the stable part of the tip – edges will fall away as the ground stabilises

(5) Visibility must be sufficient for the tipping operation, with all round vision provided to the driver and adequate lighting if used at night. In poor visibility such as fog then tipping must be suspended.

Whether you are driving a road or site vehicle you

must only tip on stable ground without a cross gradient. You should not tip down hill as if the load gets stuck it will tip the truck over. The best is to tip uphill on a slight gradient.

Edge protection can be purpose built crash barriers or made from suitable materials such as scalplings. Boulders on their own are not suitable as edge protection but they can be used to delineate haul roads around flat areas of the quarry.

Edge protection should be a minimum of 1.5m (5 feet) or the radius of the wheel i.e. half the diameter of the wheel or the axle height whichever is the larger.

The front profile of the edge protection should be made so that vehicles will not drive up and over. Remember that edge protection can deteriorate due to weathering, so it must be properly maintained and inspected under the inspection and maintenance scheme.

The purpose of edge protection is to warn the driver that the edge is there. It works by catching the vehicle or by overturning it back onto the road. To do this it has to be well constructed and sufficiently large to absorb the momentum of the machine. Part of the tip and excavation rules will have to determine the size of the edge protection you intend to use and where. Guidelines state that it should be 1.5m or the radius of the wheel whichever is the larger for most use. On ramps etc. you may need to put higher bunds in place.